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Subject: Douglas-fir Beetle Activity in Rodeo-Chediski Fire (blackmesard)

To: District Ranger, Black Mesa RD

On September 10-12, 2003, I visited with Brian Dykstra, Wildlife Biologist with the Black Mesa RD, to discuss bark beetle activity in Mexican spotted owl "Protected Activity Centers" (PACs) within the Rodeo-Chediski Fire perimeter. We also discussed methods for assessing the effectiveness of preventive treatments implemented in 2003 to reduce bark beetle attacks within the PACs. I describe in this report past and current bark beetle activity within these PACs, preventive treatments that took place in 2003, and make recommendations for the 2004 season.

During my visit to the Black Mesa RD in September 2002, we observed that within some of the PACs, crowns of all trees were completely consumed by fire. In other PACs, medium and large-diameter Douglas-fir were significantly scorched (e.g., more than 50 percent of the crown and 100 percent of the lower bole were scorched). These trees will be highly susceptible to attack by Douglas-fir beetle, *Dendroctonus pseudotsugae*. Where such susceptible trees are abundant, once they are infested and killed, beetle populations can build up rapidly and spread to adjacent stands (Schmitz and Gibson, 1996). There have been several documented cases of Douglas-fir beetle reaching outbreak status following fire scorch damage to Douglas-fir (Pasek, 1990; Schmitz and Gibson, 1996).

Douglas-fir beetle biology

Douglas-fir beetle has one generation per year. Broods remain in the tree and overwinter mainly as adult beetles, but also as larvae. Initial adult flights vary from year to year with location and weather, but most new attacks take place in mid- to late spring (i.e., mid-May). Larvae that have over-wintered complete their development and emerge as adults in the summer. Typically, late-season attacks account for less than 20 percent of all attacks in one season.

Douglas-fir beetles preferentially attack large, old trees in dense stands with a high Douglas-fir component (Schmitz and Gibson, 1996). The duration of Douglas-fir beetle outbreaks can be quite variable, lasting from two to several



Figure 1. Fresh boring dust created by Douglas-fir beetle within the Rodeo-Chediski Fire, Black Mesa RD. Note that the dust is rust-colored. Woodboring insects create white-colored dust. Photo taken on September 11, 2003.



years. Outbreaks may result in the mortality of large numbers of trees and can interfere with resource management objectives.

Douglas-fir beetle activity in 2002

Although we did not have time to conduct a formal survey, we did, in fact, find infested trees within the burn area. During our 2002 aerial detection survey conducted on the Apache-Sitgreaves NFs, more than 500 Douglas-fir beetle-killed trees were mapped. We were not able to survey within the boundary of the Rodeo-Chediski Fire; however, several Douglas-fir mortality polygons were mapped just to the northwest of the fire boundary.

Preventive treatments to reduce Douglas-fir beetle activity

To take a proactive approach to prevent spread of this beetle within and from the burn area, we recommended the deployment of anti-aggregation pheromone for Douglas-fir beetle for 2003. The anti-aggregation pheromone (3-methylcyclohex-2-en-1-one [MCH]) serves to disrupt aggregation behavior of beetles (Schmitz and Gibson, 1996). MCH has been used experimentally to reduce the level of attack in high-risk areas (Ross and Daterman, 1994, 1995) and is being used operationally to protect localized areas from being attacked by Douglas-fir beetle. A guide to the protocol for using MCH has been developed (Ross, et al., 2001) and was forwarded to the District.

The Black Mesa RD received Prevention/Suppression funding in the spring of 2003 for the deployment of MCH within the PAC sites. In late April through mid-May of 2003, our office worked with the Black Mesa RD Wildlife unit to deploy MCH throughout selected PAC sites. Criteria for selecting PAC sites to be treated included percent of Douglas-fir in stand, level of crown and bole damage to Douglas-fir, and previous and current owl activity. MCH was deployed in a grid fashion in which bubble capsules were stapled to trees every 40 feet throughout the area to be protected.

Douglas-fir beetle activity in 2003

Nearly 2,000 acres of Douglas-fir beetle activity was mapped across the Apache-Sitgreaves NF in 2003. Much of this activity occurred below and above the Mogollon Rim near the PAC sites of interest. During a brief ground survey conducted within the Rodeo-Chediski Fire boundary, I found scattered Douglas-fir beetle activity within areas of moderate fire intensity (**Figures 1 and 2**).

Brian Dykstra's staff conducted a thorough ground survey in the PAC sites treated with MCH. Methods for this survey included installing three 20 BAF variable radius plots 10 chains apart with 1 acre (10 chains long x 1 chain 1) transects between the plots for each PAC site. Within



Figure 2. Egg and larval galleries created by Douglas-fir beetle within the Rodeo-Chediski Fire, Black Mesa RD. Photo taken on September 11, 2003.

transects, tallies were kept of Douglas-fir trees exhibiting signs of Douglas-fir beetle attacks (**Table 1**). Signs included evidence of boring dust, pitch streams, and fading foliage. Based on these signs of attack, light to moderate Douglas-fir beetle activity was detected within the fire-scorched Douglas-fir. It should be noted that initial entry/feeding by woodborers can create orange boring dust similar to that created by Douglas-fir. Only after woodborers enter the sapwood does the boring dust become white in color. Therefore, not all of the attacks reported in Table 1 are necessarily by Douglas-fir beetle. Plot data included recording tree species, diameter at breast height (dbh), tree height, damaging agent and damage level. Plot data had not been summarized at the time of writing this report and will be reported at a later date.

Table 1. *Number of Douglas-fir trees showing signs of Douglas-fir beetle attacks in transects installed in each PAC site treated with MCH. Note: most of the attacks occurred on trees killed initially by fire.*

PAC Site	DFB Attacks/Transect (mean)
Blue Lake 8A	0
Blue Lake 8B	1.5
Blue Lake 8C	2
East Fork	4
Eubank Tank	5
Bear Canyon	5
Hangman's	2.5
Horse Tank 1A	0
Horse Tank 1B	21
Jersey Canyon 2A	12.5
Jersey Canyon 2B	8
Cemetery	2
Total	5.3

Recommendations for 2004

Based on the level of Douglas-fir beetle activity in and around the PAC sites of interest within the Rodeo-Chediski Fire perimeter, I recommend that the PAC sites be treated with MCH again in 2004. If possible, the MCH should be deployed no later than late April. Although Douglas-fir beetle typically initiates flight in mid-May in other regions across the West, I feel that we need to have the MCH in place slightly earlier within this fire area. Because of warmer spring temperatures that may occur at this site due to the lower latitude and blackened ground, Douglas-fir beetle may initiate flight a few weeks earlier.

Funds may be available from Forest Health Protection to deal with the Douglas-fir beetle situations. Requests for these funds should be in no later than October 24, 2003.

If you have any questions regarding this assessment of the current beetle activity within the PAC sites, please let us know. I can be reached at (928) 556-2074.

/s/ Joel D. Mcmillin
JOEL D. McMILLIN
Entomologist, Forest Health,
Arizona Zone

cc: Brian Dykstra, Gayle Richardson, Deb Bumpus, John Anhold, Debra Allen-Reid, Leonard Lucero, Mailroom R3 Apache Sitgreaves, Kathleen Klein